(No Model.) 3 Sheets—Sheet 1.

G. T. WHITNEY.

BORING MACHINE.

No. 561,950. Patented June 9, 1896.

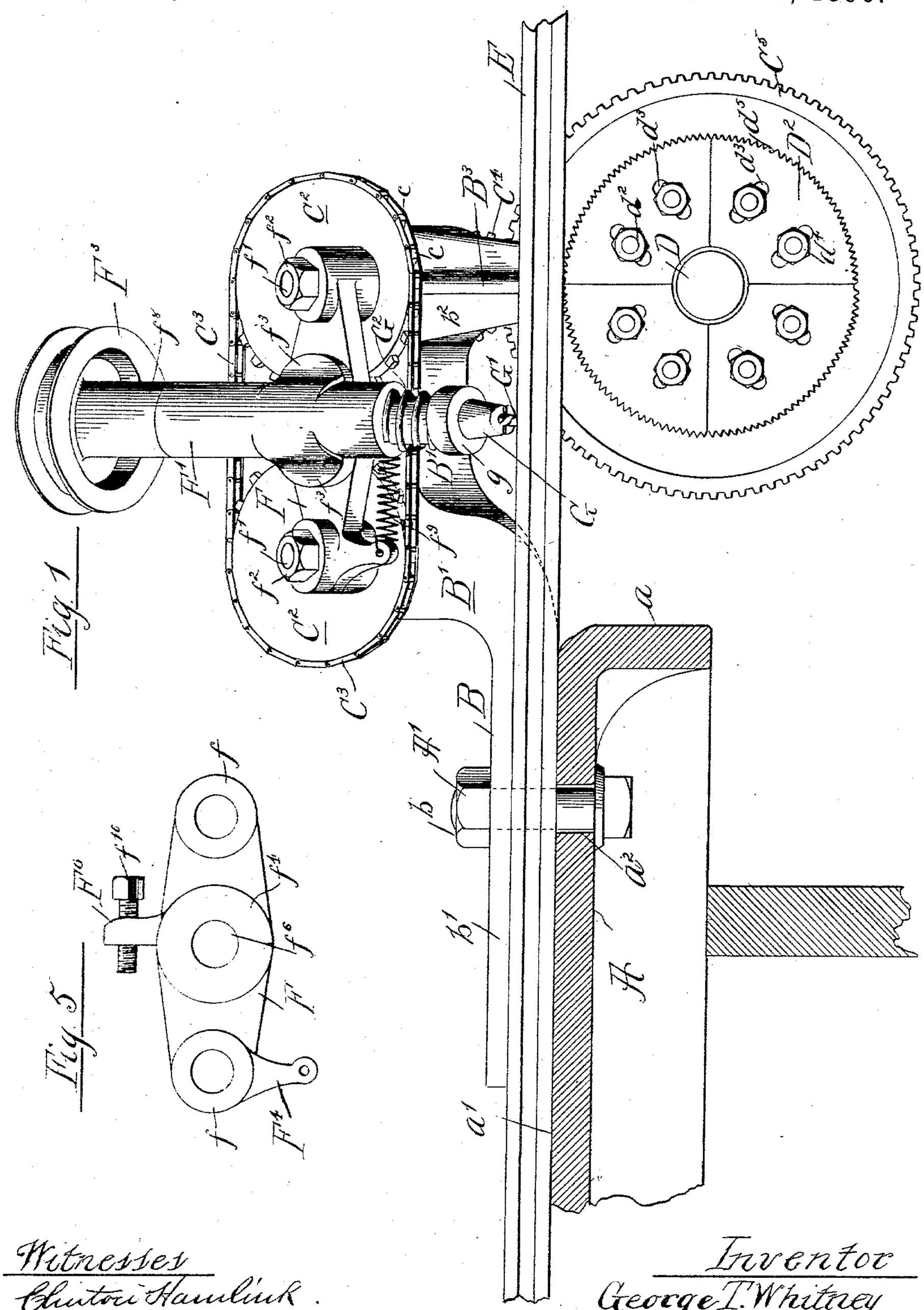

Fig. 1

Fig. 5

Witnesses
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John W. Adams

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George T. Whitney
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his Attorneys

(No Model.)

3 Sheets—Sheet 2.

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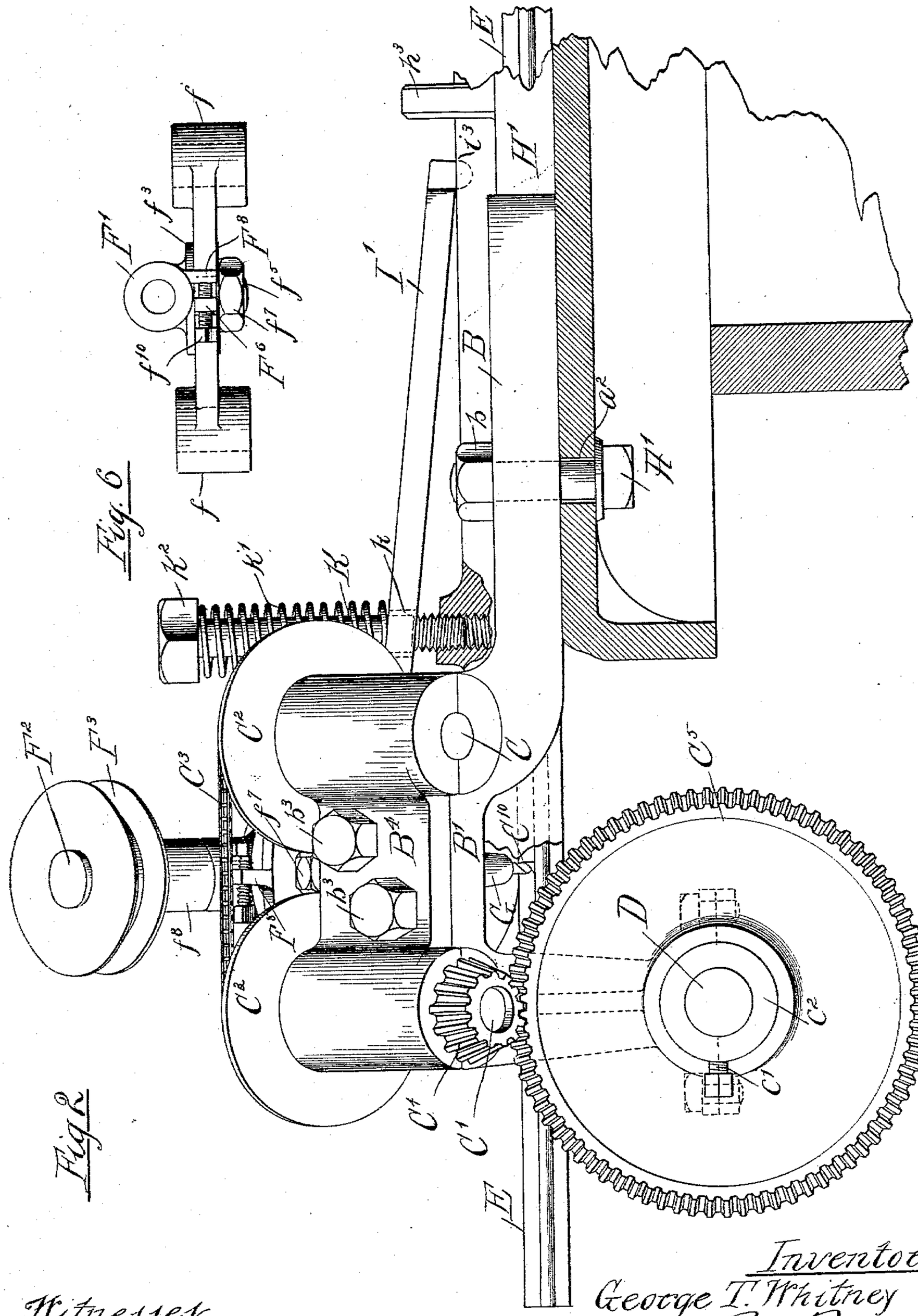

Fig. 6

Fig. 2

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(No Model.)

3 Sheets—Sheet 3.

G. T. WHITNEY.

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Fig. 3

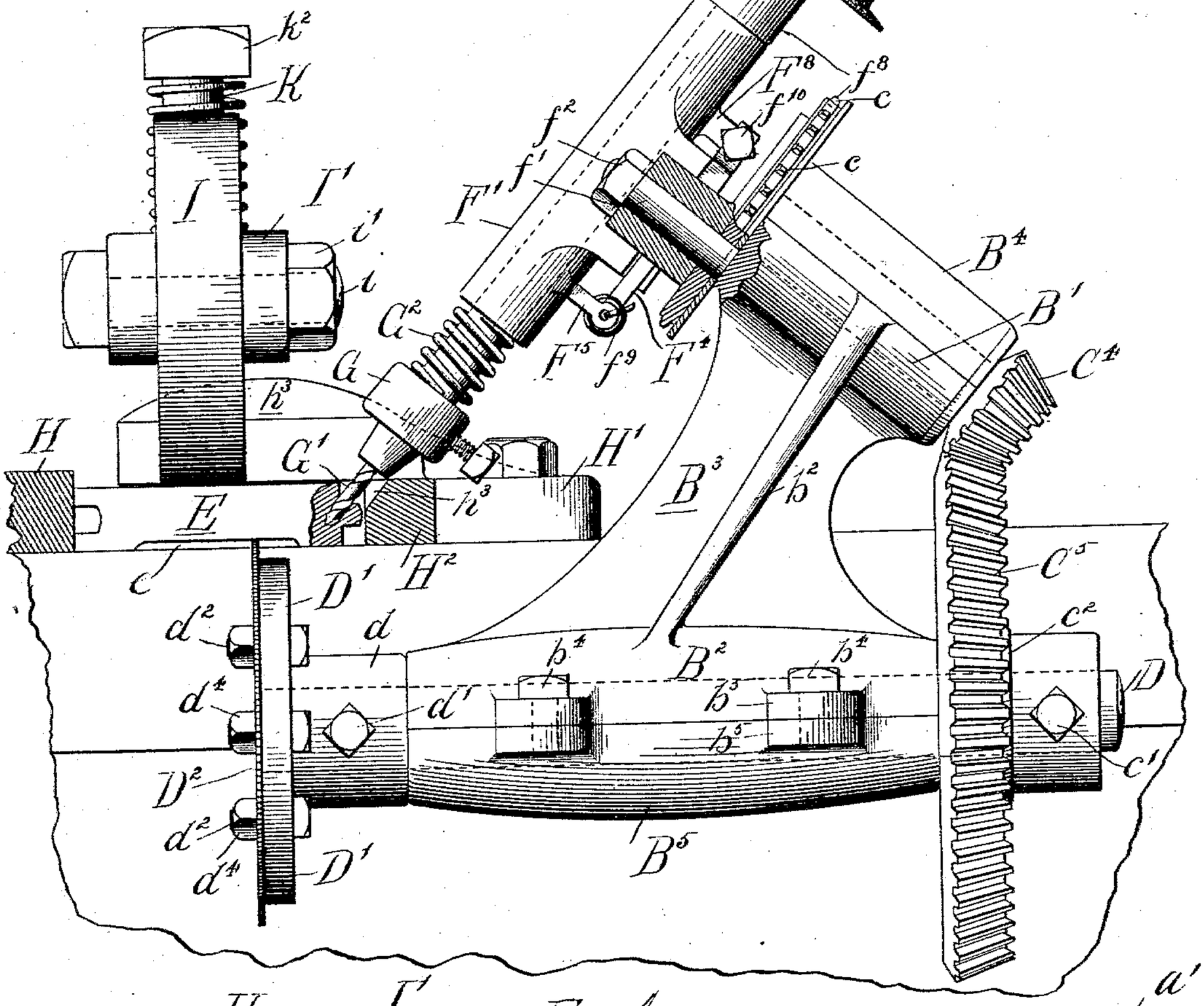
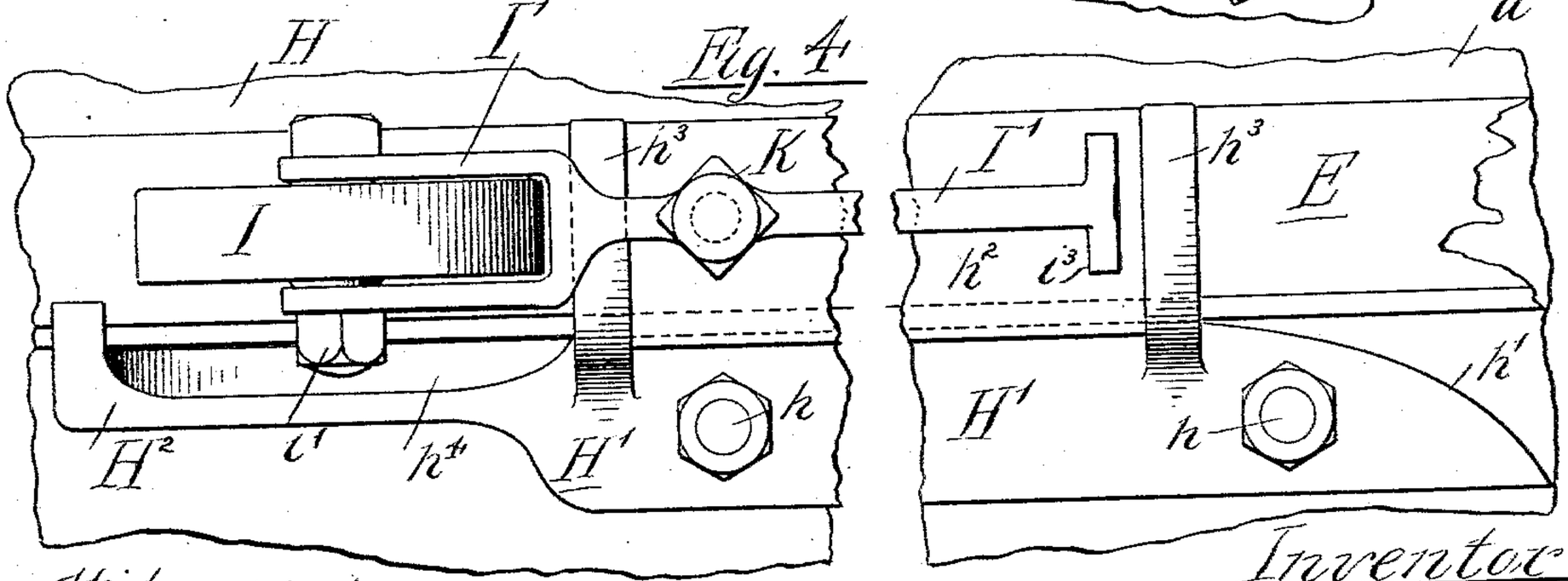


Fig. 4



Witnesses:
Clinton Hamlink
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UNITED STATES PATENT OFFICE.

GEORGE T. WHITNEY, OF CHICAGO, ILLINOIS, ASSIGNOR TO JUSTUS M. STEVENS, OF SAME PLACE.

BORING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 561,950, dated June 9, 1896.

Application filed August 9, 1895. Serial No. 558,796. (No model.)

To all whom it may concern:

Be it known that I, GEORGE T. WHITNEY, of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Boring-Machines; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

This invention relates to improvements in devices for boring lumber, and more particularly to that class of devices adapted to be used in connection with matching-machines for boring holes diagonally through the matched edges of the lumber.

My present invention is embodied in a device adapted to be attached to the exit end of a matcher, and is so arranged with reference to the piece of lumber passing through the matcher that the travel of the lumber will actuate the device so as to properly move the boring-tool or drill bodily toward and away from the lumber as the latter is passing through the machine, its boring-spindle being driven to its work proper by an independent driving mechanism. As will be noticed from an examination of the accompanying drawings, the drill is set at a proper inclination and its spindle is mounted in a swinging head. The arrangement of the parts shown is such that the drill will enter the board at intervals of four inches; but this distance may be varied as desired, so as to bore the holes a greater or less distance apart.

The invention consists in the novel devices shown and described, and more particularly pointed out in the appended claims.

In the drawings, Figure 1 represents a side view of my improved device attached to the end of the bed-plate of a matching-machine, the latter being shown in vertical section. Fig. 2 is a rear view of the same, the matcher being also in section. Fig. 3 is a side view of the device, looking toward the end of the matcher, with portions broken away to more clearly illustrate the construction. Fig. 4 is a plan view of an improved form of guide and of the tension devices employed for causing the lumber to move properly through the machine. Figs. 5 and 6 are detail views of parts hereinafter described.

Referring now to the drawings, A represents the bed-plate of a matcher or other suitable machine to which it is desired to attach my improved boring device, a representing the end thereof and a' the top or bearing-surface. Transversely of the bed-plate is arranged either a slot or a series of apertures a^2, by means of which I am enabled to secure the frame of my improved boring device thereto, usually by means of a bolt A′ passing through the apertures or slots a^2 and through the frame B, the latter being secured to the bed-plate A by the nut b. In practice there will be several of the bolts A′ to properly hold the boring device in place. While this is a convenient method of attachment, it will be obvious that other connections may be employed, if desired. The said frame B comprises the arm b', through which the bolts A′ pass, and an upwardly-deflected and horizontally-arranged part B′, to the forward end of which is cast or otherwise secured the upper end of the journal box or bearing B^2. I prefer to unite the part B^2 with the part B′ by means of an arm B^3, having strengthening-ribs b^2, as clearly shown in Figs. 1, 2, and 3. A cap-plate B^4 is arranged to fit over the part B′ of the frame and to be secured thereto by means of bolts b^3, and when so secured the parts B^4 and B′ will form a pair of bearings for parallel shafts C C′, which pass through and rest in suitable apertures made in the adjacent faces of said parts B′ and B^4.

To the forward end of each shaft C and C′ is secured a disk C^2, provided on its periphery with sprocket-teeth c, and a sprocket-chain C^3 passes around both of said disks C^2 C^2 and connects them so that they will move in unison. To the rear end of the shaft C′ is secured a bevel-pinion C^4, which latter meshes with a bevel-wheel C^5, mounted upon a driven shaft D. The shaft D is held in a bearing formed by the part B^2 of the frame and a cap B^5, the cap B^5 being secured to the frame B^2 by stud-bolts b^4, passing through suitable lugs b^5 on said cap and frame.

The bevel-wheel C^5 is secured to the end of the shaft D by means of a set-screw c', which

passes through the hub c^2 of the wheel C^5 and impinges against the shaft D. To the forward end of the shaft D is secured a circular plate D′, provided on its rear with an apertured hub d, the plate D′ being secured to the shaft D by a set-screw d', passing through said hub d and engaging the shaft D. The plate D′ is provided with a plurality of apertures, through which bolts d^2 are passed from the rear side. The forward or front ends of these bolts d^2 pass through radially-disposed slots d^3, preferably arranged in pairs, in quarters or segments of a feed-plate D^2, and nuts d^4, engaging said screw-bolts d^2, serve to secure the segments of the feed-plate D^2 to the plate D′. The periphery of each of the segments of the feed-plate D^2 is serrated or notched, as shown at d^5, and the diameter of the plate is such with respect to the plate D′ that said serrated or notched edges d^5 will extend radially beyond the plate D′ and above the top or bed level a' of the bed-plate A, and thus be in position to be engaged by the under surface of the piece of lumber (represented by the letter E in the drawings) as the latter is fed through the matcher or other machine.

In hard-wood flooring that is matched it is customary to groove out or channel the under side of the board, as shown clearly at e, and preferably the feed-wheel D^2 will be so positioned that its serrated edges d^5 will engage the cut-away portion e of the board E. The slots d^3 permit of the accurate adjustment of the segments of the wheel D^2 whenever desired. If, for example, the teeth become dull, refiling of the same would reduce the diameter of the wheel, and this can be compensated for by loosening the nuts d^4, moving the segments outwardly a proper distance, and then tightening the nuts d^4 upon their respective bolts.

It will be obvious from the above construction that the movement of the board E through the matcher or other machine will actuate the disks C^2 through the medium of the feed-wheel D^2, shaft D, bevel-wheels C^5 C^4, and the shaft C′.

I will now proceed to describe the drill-carrier arm and parts mounted thereon, first premising that the carrier is mounted eccentrically upon the disks C^2 in such manner as to cause the drill to enter the edge of the board E at predetermined intervals—for example, once every four inches—this distance being determined by the diameter of the wheel D^2, bearing a fixed relation to the number of teeth in the wheels C^4 C^5 and the amount of throw or depth of bore to be given to the drill. The carrier-arm F is shown more clearly in Fig. 5. It is provided at each end with apertured hubs f, through which hubs the studs f' are passed. Said studs f' are each suitably secured in an aperture in the disk C, so as to project through the hubs f, said bolts being secured to the disks by the nuts f^2. The apertures in the disks C^2, through which the studs f' project, are placed eccentrically to the center of each disk. By reference to Fig. 1 it will be apparent that the carrier-arm F is thus secured eccentrically upon said disks C^2, and in the rotation of the latter on their respective centers—*i. e.*, the shafts C C′—said arm will be moved lengthwise with the lumber E, and also laterally toward and from the lumber. In other words, the eccentric movement is such as to cause the drill carried on this carrier F to move gradually toward the lumber, enter it the required distance, and then gradually move out of the lumber and return to the first movement, the drill being carried forward and back in proper relation to the speed of the traveling board E.

F′ is a journal provided with a drill-carrying spindle F^2 passing therethrough, said journal being provided with a lateral enlargement f^3, which constitutes a bearing-surface adapted to engage the face f^4 of the carrier-arm F. The journal F′ is provided with a depending pivotal stud f^5, (indicated in dotted lines, Fig. 6,) which projects through an opening f^6 through the center of the carrier-arm F. A nut f^7, engaging the screw-threaded end of the bolt or stud f^5, pivotally secures the journal F′ to the carrier.

Upon the end of the drill-spindle F^2 is mounted a pulley-wheel F^3, provided with a hub f^8, the end of the latter bearing against the upper end of the spindle-journal F′. Obviously other suitable means may be employed to operate the drill-carrying spindle F; but I prefer the belt-pulley F^3, which may be actuated from any suitable source of power. (Not shown in the drawings.)

The drill-spindle F^2 will be operated independently of the other parts of the device.

G is a chuck carrying the drill G′. Said chuck is mounted on the end of the spindle F^2, and between its enlarged head g and the lower end of the journal F′ is a spiral spring G^2, coiled about the drill-carrying spindle, thus providing a cushioning device for the drill G′.

Attached to the carrier F is an arm F^4, to the outer end of which I secure one end of a coiled spring f^9, the other end of said coiled spring being secured to the end of an arm F^5, that projects from the under side of the bearing F′.

F^6 designates a second lug or arm upon the carrier F, extending oppositely to the arm F^4 and provided with an adjustable stop in the form of a set-screw f^{10}. The end of said screw f^{10} is adapted to engage with a lug or arm F^8, projecting from the upper part of the bearing F′, and thus limit the oscillation of the latter with relation to the carrier F under the action of the spring f^9. The purpose of the spring f^9 is to normally hold the bearing F′ and the parts carried thereby in operative position with respect to the traveling board E—to wit, in a position shown in Figs. 1 and 3—and at the same time to provide against the sudden breaking of the drill G′ if, for any reason, the feed-wheel D^2 should be-

come disarranged or should slip and thus the movement of the carrier-arm F cease. In such case if the drill be in the board E and the latter continues its forward movement through the matcher the drill would be broken off unless a pivotal movement is provided for the drill-carrying spindle, such, for example, as the pivotal connecting-stud f^5 and the spring f^9. Under the condition just described the spring f^9 would yield and the bearing F′ would turn on the pivot-stud f^5 until the point of the drill G′ had been withdrawn from the board E.

Since the bodily movement of the drill toward and from the board, as well as the lengthwise movement of the drill, is accomplished by mechanism above described, which is driven by the board E pressing upon the feed-wheel D^2, it will be necessary to provide suitable mechanism for insuring the certain engagement of the board with said feed-wheel as the board moves through the matcher or other machine, and I have illustrated in Figs. 3, 4, and 6 one form of such mechanism, although I do not desire to be limited thereto.

H represents any suitable guide upon the matcher or other machine, against which one side of the board E may be placed. H′ represents another guide, against which the opposite side of the board will rest, the board passing between the two guides. The guide H′ is secured to the bed-plate A by any suitable engagement, as, for example, the bolts h. The rear or entrance end is grooved or cut away, as shown at h', to facilitate the entrance of the board E to the space between the two guides H H′. The central portion h^2 of the guide H′ extends outwardly over the path of the board E and is strengthened by ribs h^3. The lower side of the central portion h^2 is raised above the bed-plate A a distance sufficient to allow the board E to pass beneath, as clearly shown in Fig. 3. The forward end of the guide H′ is narrowed into an arm H^2, the upper end of which is chamfered or cut away, as shown at h^4, in order that the drill G′ may have an unobstructed path toward and from the board E.

A presser-wheel I bears upon the top of the board E and holds it in contact with the feed-wheel D^2. The wheel I is mounted upon a stud-bolt passing through the apertured ends or eyes of a spring-pressed bifurcated or forked arm I′, the nut i' holding the bolt in position. The rear end of the arm I′ rests in a suitable depression i^3 in the parts h^2 of the guide H′. An adjusting-bolt K is secured to the parts h^2 of the guide-plate H′ after first passing through a suitable slot or aperture k in the central part of the arm I′. A spring k' surrounds the adjusting-screw K and presses at one end against the under side of the bolt-head k^2 and at its other end against the upper side of the arm I′. By forcing the bolt K up or down the tension of the spring k' is increased or relieved as desired, and the requisite tension is thus imparted to the wheel I.

From the foregoing description it will be seen that I have provided a boring attachment embodying substantial features of improvement and which may be applied to any machine adapted to pass the lumber longitudinally therethrough.

The arrangement by which the bodily movement of the tool in its approach, entrance, and recession from the material is governed by the movement of said material itself rather than by means driving the tool independently of the travel of the material is a feature of vital importance, inasmuch as in such event failure of the material to feed forward properly would simply result in arresting the bodily movement of the drill, whereas if the latter were actuated by means independent of the movement of the material the tool would almost certainly be broken, and in any event the drill-holes would not be properly spaced.

The arrangement by which the tool is held yieldingly in operative position is also a feature of importance, since it is necessary to provide for more or less tilting of the tool (depending upon the thickness of material) to compensate for variable rate of travel of the tool with relation to the material operated upon incident to circular path of movement of the former.

I claim as my invention—

1. In a machine for boring holes in lumber while the latter is being moved bodily through a machine, the combination of a drive-wheel having peripheral engagement with the traveling board, a pair of parallel shafts arranged to extend at right angles to the direction of movement of the board and driven at a uniform speed from said drive-wheel, an eccentric-disk upon each shaft provided with an eccentrically-located wrist, a link or carrier mounted upon said wrists so as to be carried in an orbit by the latter and maintained at a fixed angle with relation to the board, and a suitably-driven boring-tool pivotally mounted upon said carrier and held yieldingly in fixed angular relation thereto by means of a coiled spring connected with a part of the carrier and boring-tool and acting to oscillate said boring-tool upon its pivot in one direction, and a fixed stop arranged to limit said oscillatory movement of the boring-tool under the action of the spring.

2. A boring-machine adapted to be attached to a matching or other machine, comprising a frame B provided with three bearings, shafts C C′ D mounted in said bearings, disks C^2 C^2 mounted upon the shafts C C′, means for rotating said disks in unison, a pinion C^4 also mounted on the shaft C′, a bevel-wheel C^5 mounted on a shaft D, a feed-disk D^2 also mounted on the shaft D, a carrier F mounted on each of the disks C^2 eccentrically to their centers of motion, a drill-carrying spindle mounted on said carrier F, a spring connected at one end to said carrier F, and at the other end to said drill-carrying spindle for normally holding the latter in operative position, and

means for independently rotating said spindle, substantially as described.

3. In a boring-machine adapted to be secured to a matcher or other machine whereby bodily lateral and lengthwise movement of the boring-drill is secured by the movement of the material through the matcher or other machine, the feed-disk D^2 consisting of a plurality of segments each adjustable radially and provided with notched or serrated edges and positioned to be engaged by the material moving through said matcher or other machine, and means for securing the segments of the disk in adjusted position, substantially as described.

4. In a machine for boring holes in lumber while the latter is being moved bodily through a machine, the combination with a suitably-driven boring-tool pivotally mounted upon a carrier which carries the tool bodily in an orbit the plane of which is parallel with the direction of movement of the material, of means for actuating said carrier in unison with the feed movement of the material, and means for holding the boring-tool yieldingly in perpendicular relation to the material comprising a spring or equivalent acting on the boring-tool to hold it in fixed angular relation to the carrier, and a stop limiting the movement of the boring-tool under the action of the spring, substantially as set forth.

5. In a machine for boring holes in lumber while the latter is being moved bodily through a machine, the combination with a suitably-driven boring-tool mounted upon a carrier which carries the tool bodily in an orbit the plane of which is parallel with the direction of movement of the material, of means for actuating said carrier in unison with the feed movement of the material, means for advancing the boring-tool yieldingly to its work comprising telescopic connection between the tool-carrying mandrel and its journal, and a coiled spring arranged to hold said mandrel projected and means for holding the boring-tool yieldingly in perpendicular relation to the material comprising a pivotal connection between the tool-journal and said carrier, a stop adapted to limit the oscillation of the tool in one direction, and a coiled spring connecting the tool-journal and carrier, substantially as described.

In testimony that I claim the foregoing as my invention I affix my signature, in presence of two witnesses, this 26th day of July, A. D. 1895.

GEORGE T. WHITNEY.

Witnesses:
TAYLOR E. BROWN,
WILLIAM S. HALL.